



Preliminary System Development Plan for an AERIS Data Capture and Management System

Project Overview

This project examined the relevance of the Federal Highway Administration's (FHWA's) *Clarus* and the Michigan DOT's Data Use Analysis and Processing (DUAP) data, and their core system designs, to the needs of the AERIS program. The project also recommended a Preliminary System Development Plan for an AERIS data capture and management system. *Clarus* and DUAP represent state-of-the-art tools for data acquisition from both fixed and mobile sources, including connected vehicle data gathered from vehicle fleets. Since the *Clarus* and DUAP systems are operational and significant investment has already been made, the intent of this project was to determine how AERIS could leverage these assets and leapfrog some of the normal system development cycle.



Mixon Hill

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FHWA's *Clarus* System

FHWA's *Clarus* System collects, quality checks, and distributes surface weather and road condition observations and provides access to these data sets to state and local transportation agencies and value-added commercial weather service providers. The *Clarus* System hosts a variety of collector services that are responsible for collecting environmental observations from disparate sources. *Clarus* takes advantage of the substantial investments by state and local DOTs in Road Weather Information Systems (RWIS) that include Environmental Sensor Stations (ESS) to obtain atmospheric, surface, and subsurface weather observations for use in maintenance and operations activities. Most ESS are permanently fixed at sites throughout each state. More recently, however, the DOTs have started collecting mobile observations through deployment of sensors on their maintenance vehicles. In both the permanent and mobile ESS, air quality sensors are available for collection of observations

Michigan DOT's DUAP

From the outset, Michigan DOT's DUAP project envisioned the collection of data from multiple sources: the federal VII Proof-of-Concept Demonstration; a fleet of vehicles providing diagnostic data; ITS roadway and roadside sensors collecting data for traffic management and maintenance activities; and latterly a fleet of MDOT-owned vehicles equipped with data collection devices to fill identified gaps in the available data sets from other sources. The system development process was based on these objectives and constraints. A core development challenge for the DUAP system was to gather data from multiple mobile platforms, where each source of data possesses its own data collection rates, formats, availability, and network transmission protocols. The purpose of the collector services is not only to gather mobile data from disparate sources, but also to translate those data into a common data storage format for processing.

Conclusions

The final report concluded that the capabilities developed for and demonstrated by the *Clarus* and DUAP systems are directly applicable to the AERIS Data Capture and Management System. The use of these capabilities for environmental applications, however, would require development of new components outside the scope of those existing systems. This includes user interfaces, data quality checking and processing algorithms, and collection schemes. The development process for these components that would be unique to an AERIS system and it is recommended that if undertaken, a systems engineering process should be followed to assure an efficient and effective implementation.